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Classification be urged to do so, on the ground that the advantages of general uniformity should outweigh any local preference.

Assurance of active coöperation of the government with the committees is given by the appointment of Mr. William A. King, Chief Statistician of the U. S. Census for Vital Statistics, as Chairman of the American Public Health Association's Committee on "Demography and Statistics in their Sanitary Relations," while Dr. Walter Wyman, Surgeon-General of the U. S. Public Health and Marine-Hospital Service, was elected President of the Association for the ensuing year.

I had intended to make some reference to the very important practical subject of treatment of jointly returned causes of death,—one of the difficulties that must be met in some way in a registration office, and to which one of the resolutions refers. It may be better, however, to reserve this subject for a special paper, which I shall, accordingly, endeavor to present to the American Statistical Association at an early date.

CRESSY L. WILBUR.

STATISTICS OF SMALL-POX AND VACCINATION.

The *Hygienische Rundschau* for January contains a very thorough study of a small epidemic of small-pox in the province of Cagliari, in Sardinia, by Sanfelice and Malato. The disease, entirely absent from 1891 to 1897, was introduced from Tunis in the latter year and increased to a monthly maximum of 34 cases in January, 1898. In February and March the cases fell to 5 and 7, and popular alarm was allayed before thorough vaccination had been accomplished. The disease persisted through the spring and broke out again with new force, causing 32 cases in August and 29 in September. In October the authorities were at last aroused to action and vaccination was made compulsory. While some 14,000 persons were vaccinated between December, 1897, and December, 1898, there were 25,000 vaccinations from December, 1898, to February, 1899. As a result the number of new cases fell from 20 in October, 22 in November, and 17 in December, to 3 in January, and 2 in February, after which the epidemic ceased. The authors, including as unvaccinated all cases of unsuccessful vaccination and all cases in which vaccination was accomplished only

a few days before the development of the small-pox symptoms, calculate that the ratio of cases to deaths among the unvaccinated varied from 3.47 to 5.75 in the different age classes, while for the vaccinated the figures were between 16.59 and 20.16.

Dr. L. C. Pakes, on "The Prevention of Small-pox" in *Public Health* for December, 1902, reviews the epidemic that visited London in 1901-02. During the year preceding September 27, 1902, there were 9171 cases notified in the metropolis with 1505 deaths "giving a case rate of 20 per 10,000 of the population, a death rate of .33 per 1000, and a fatality of 16.4 per cent of the notified cases." Dr. Pakes adds tables showing the quarterly prevalence of small-pox since 1856 and the distribution of the present outbreak by boroughs; but no figures are given as to vaccination.

The Journal of State Medicine for January contains two rather apologetic accounts of the famous "Leicester" experiment by two town officials, the chairman of the Public Health Committee and the medical officer of health. Leicester is a stronghold of English anti-vaccinationists, and after 1886 the yearly total of vaccinations never rose above 500 and finally fell to less than 2 per cent of the births. In 1892 there occurred 38 cases; in 1893, 308; in 1894, 8; in 1895, 4; and in 1901, 4 cases without any such general spread of the disease as had been predicted. This result has been accomplished by vigilant supervision on the part of the authorities, by prompt reporting of cases and immediate isolation of patients and their families. As Dr. Millard, the medical officer of health, explains it, "a handful of the population, including the medical men, sanitary staff, small-pox nurses, etc., are as well vaccinated in Leicester as in any other town, so that a cordon of protected persons can at once be drawn round any case of small-pox which may occur." It is interesting to note that an experiment of this sort can be successfully carried on for a period of fifteen years in a large English municipality; but this result of good luck, combined with extraordinary vigilance in a single town, can scarcely outweigh the experience of a century in the whole of Europe.

Dr. Arthur Newsholme in the *British Medical Journal* for July 5, 1902, discusses "The Epidemiology of Small-pox in the Nineteenth Century" and gives most instructive diagrams of small-pox mortality in London, Glasgow, Hamburg, Stockholm, Prague, Florence, Christiania, Montreal, Chicago, Paris, Copenhagen, Mexico, and Rio

de Janerio. It seems impossible that the most skeptical can look at the London table covering the period from 1650 to the present day without being convinced that some new force suddenly appeared about 1800 to control the ravage of this disease. The contrast between the death rate since 1872 in Hamburg and Stockholm, on the one hand, and Prague on the other, is also striking. Dr. Newsholme devotes himself mainly to a consideration of the periodicity of the disease, and, while it is apparent that minor epidemics recur at short intervals of three or four years, he concludes that there is no evidence of the existence of a definite cycle of greater epidemics separated by longer periods. The recurrence of minor epidemics is explicable as the result of an accumulation of susceptible individuals, but, according to Dr. Newsholme, "there is some further factor responsible for the causation of the greater epidemics and pandemics." He finds the attempts to show some relation between these exceptional outbreaks and meteorological conditions to be inconclusive; and leaves the matter in doubt. From a bacteriological standpoint the development of a race of germs of unusual virulence would serve to account for such phenomena.

The *Journal of the Institute of Actuaries* for October, 1902, contains an able review of small-pox statistics, by A. F. BurrIDGE, under the title, "Vaccination and the Act of 1898." Mr. BurrIDGE begins with a concise history of inoculation and vaccination and a digest of English and colonial laws on the subject. The course of the disease in London is then indicated by a diagram showing the ratio of small-pox deaths to deaths by all causes since 1700. The general increase of small-pox during the eighteenth century and its sharp decrease between 1800 and 1830 are very clear. The low level since maintained has been broken only by the epidemic of 1870, and even that is insignificant, beside those which occurred every three or four years in the previous century. No less striking are the succeeding curves which show the small-pox mortality in various countries from 1850 to 1900. Since the pandemic of 1871-74 the small-pox in England, Scotland, Sweden, and Prussia, where vaccination is compulsory, has been inappreciable; in Austria and Belgium, on the other hand, vaccination is not compulsory and the amount of small-pox, considerable. Next, Mr. BurrIDGE considers the effect of vaccination upon age incidence, and shows that the decrease of small-pox has affected mainly the earlier periods of life, a gradual weakening of the effect of infant

vaccination causing the curve of small-pox at ages above 45 to show no marked decline since 1850. Comparison with curves for the other zymotic diseases of childhood shows that measles and diphtheria exhibit no decrease like that shown by small-pox, indicating that the improvement cannot be attributed to general sanitary conditions. After these general considerations, Mr. BurrIDGE considers the epidemic of 1887-88, at Sheffield, in some detail. Here a fairly thorough census of the borough was made to determine the vaccinated and unvaccinated population. As this census was not undertaken until the epidemic had been for some time under way, many persons were returned as "vaccinated" who had been vaccinated during its course and thus the number of unvaccinated apparently exposed to risk was unduly small. A thorough examination of selected localities gave a correction of + 38.6 per cent to be applied to the "unvaccinated" population, and even after this had been made the death rate per 100,000 was 3478.7 in the unvaccinated against 75.1 in the vaccinated class. The necessity for such a large correction throws some doubt on these figures. After brief reference to certain hospital statistics, showing a ratio of deaths to cases four or five times as great among the unvaccinated as among the vaccinated, the experiences of the French, Prussian, and Austrian armies is considered. In the Prussian army general vaccination on entering the service has been enforced since 1834; in the French army, although repeatedly ordered, it has only been thoroughly carried out since 1888; and in the Austrian army no vaccination was necessary prior to 1886. The following figures are typical of the rest:—

ATTACKS PER 100,000 MEAN STRENGTH.

	1875-85.	1886-96.
Prussian army	4.7	3.2
French army	133.6	32.6
Austrian Army	333.7	35.8

In conclusion, Mr. BurrIDGE quotes the experience of Prussia with compulsory revaccination: "Since 1885 not one person in 100,000, and since 1894 not one in 1,000,000 has died of small-pox."

A Concise History of Small-pox and Vaccination in Europe, by Edward J. Edwardes, M.D. (H. K. Lewis, 136 Gower Street, London, W. C., 1902), is an admirable compendium of the most important statistical material relating to the subject; and the author's method of handling his figures is marked by ability and fairness. The little

book, of only 142 pages, begins with a historical résumé containing many interesting quotations from early writers, and then proceeds to exhibit the condition of affairs during the eighteenth century. In general, it appears that small-pox then caused in Europe something like one-twelfth of the deaths from all causes, and from 2000 to 4000 per million living population. After the introduction of vaccination, by Jenner, in 1801, a rapid decrease took place. Thus, in Sweden, the small-pox death rate per million was 1914 for the decade, 1792–1801, 623 for 1802–11, and 133 for 1812–21. The same effect was apparent in England, Germany, and Denmark; and these abrupt changes on the discovery of the new process form the first class of facts which prove the efficacy of vaccination. The second sort of evidence is that furnished by the experience, at the same period, of different countries having a varying amount of vaccination. Thus, in the great epidemic of 1870–75, four countries with compulsory vaccination had small-pox death rates as follows: England, 361; Scotland, 314; Bavaria, 346; Sweden, 333. Of countries without compulsory vaccination, on the other hand, during the same period, Prussia had a death rate of 953, Austria of 1360, Belgium of 1293, and the Netherlands of 958. In 1874 vaccination and revaccination were made compulsory in the German Empire; and since 1886, when statistics began to be available, the death rate has ranged from 4.2 to .1 per million. The third great class of facts in support of the efficacy of vaccination includes the statistics as to the prevalence of small-pox among the vaccinated and unvaccinated in the same community. For instance, at Chemnitz, in 1870–71, a special census was made to determine the condition of the general population; the attack rate among the protected was 1.6 per cent, and among the unprotected, 46.3 per cent. Dr. Edwardes quotes also the statistics for Gloucester, and a number of other English cities, but to the most interesting method of analysis, from a statistical standpoint, he only refers in his preface. This is the device suggested by Körösi, who found that out of 14,678 persons dying from various causes in certain Hungarian hospitals in 1886, the unvaccinated constituted 14 per cent of those who died from other diseases than small-pox and 81 per cent of those who died from small pox. This is extremely important because it answers the objection, made to such figures as those quoted for Chemnitz and Gloucester, that the unvaccinated represent a specially feeble class of the community or a class exposed to specially unsani-

tary conditions. The fourth sort of evidence derived from a comparison of the ratio of deaths to cases among the vaccinated and the unvaccinated is not given much space by Dr. Edwardes; but the statistics for Leipsic show a fatality, under 15 years, of 3 per cent among the vaccinated, and 35 per cent among the unvaccinated,—over 15 years, of 9 per cent among the vaccinated, and 44 per cent among the unvaccinated. Altogether the statistical evidence of the protective effect of vaccination is absolutely conclusive; and it has never been better presented than in this little book.

C.-E. A. WINSLOW.

RECENT SANITARY REPORTS.

European Statistics for 1899.

The *Achtzehnter Jahresbericht über die Fortschritte und Leistungen auf dem Gebiete der Hygiene* for 1900 contains, as usual, a summary of vital statistics and, in particular, of German statistics, by Dr. Heimann of Berlin. The comparison of statistics collected in different countries is liable to serious errors, but may often be suggestive and interesting. In excess of births over deaths the Netherlands led the countries tabulated in 1899 with a birth rate of 32.0 and a death rate of 17.1 per 1000; for the German Empire the figures are given as 35.9 and 21.5; for Great Britain, 29.4 and 18.4; and for France, 21.2 and 21.1. It is somewhat surprising that 285 German cities of over 15,000 inhabitants, with a total population of 15,857,035, or 28 per cent of the total for the empire, should have a birth rate of only 34.8 and a death rate of only 21.0, both figures being lower than those for the country as a whole. In the table of Swiss statistics the typhoid death rate of 8 per 100,000 in 1896-98 is a reproach to American communities; even in Massachusetts, the lowest rate ever reached was 19.5 in 1901. Switzerland also makes a fine showing in its municipal statistics, fifteen large cities having a death rate of only 17.6 per 1000 and only 13.4 deaths under 1 year per 100 births. For 33 English cities this last figure is 18.1, and in the German cities it ranges from 15.4 in Frankfurt a. M. to 32.0 in Chemnitz. With respect to the special infectious diseases it is interesting to note that while diphtheria and croup are somewhat more fatal than measles in the country as a whole, yet comparing the cities, only Austria, France, Belgium, and England show more deaths from the